

THE IDENTITY OF *SAGITTARIA ISOETIFORMIS* (ALISMATACEAE)¹

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Shortly after publishing a revision of the North American species of *Sagittaria*, J. G. Smith (1895a) received specimens of an undescribed species of that genus from Florida. Plants of this species, which he named *S. isoetiformis* (1859b), were said to be common along sandy lake margins where they formed extensive patches in the shallow water, their slender interlacing stolons bearing tufts of leaves and rooting at the nodes. The type specimen (Fla., Lake Co., Nash, March 22, 1894, MO) possesses slender, attenuate to only slightly dilated phyllodia about 1-2 mm wide—a distinctive feature which apparently suggested to Smith the leaves of *Isoetes* (hence the specific epithet). Smith (1895b) considered *S. isoetiformis* to be more closely related to *S. graminea* Michx. than to any other species.

The identity and specific distinctness of *Sagittaria isoetiformis* long went unquestioned. Recently, however, Bogin (1955) interpreted this taxon merely as an ecological variant of *S. graminea* var. *graminea*, the variant said to occur in lakes having a marked seasonal drop in water level. Beal (1960), in treating the Alismataceae of the Carolinas, made no reference to *S. isoetiformis*, but he distinguished material from the Carolinas as *S. teres* S. Watson and considered it specifically distinct from *S. graminea*. Bogin (op. cit.) had considered *S. teres* as a variety of *S. graminea* with a range from Cape Cod to southern New Jersey. We identify the Carolina plants called *S. teres* by Beal with *S. isoetiformis*, the latter ranging from southeastern North Carolina to peninsular Florida and southern Alabama, and consider *S. teres* distinct from both *S. isoetiformis* and *S. graminea* var. *graminea*.

Fernald (1950) says in part of *Sagittaria teres*: “. . . leaves erect, all represented by terete, attenuate, often nodose phyllodia; those of terrestrial plants slender and elongate (up to 6 dm long), those of deep water shorter, very thick, spongy and digit-like; . . . achenes . . . with strongly rounded crenate dorsal keel, the faces (when fully ripe) rugose and irregularly 2-4 (or more) keeled; . . .”

The terete, attenuate, nodose phyllodia characteristic of the New England *Sagittaria teres* specimens are unlike the phyllodia of material from the Carolinas southward. Note particularly Fernald's statement that those of *S. teres* are erect, slender and elongate if the plants are

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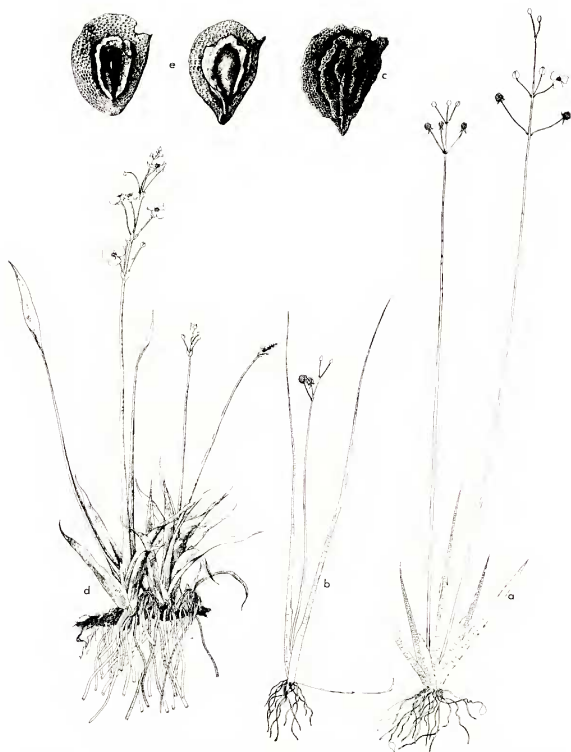


Fig. 1. a-c: *Sagittaria teres*. a. Habit, deeper water form. b. Habit, on shore form. c. Achene. d-e: *Sagittaria graminea*. d. Habit, form with submersed winter rosette and emersed leaves. e. Achenes.

terrestrial (Fig. 1b), shorter, very thick, spongy and digit-like in deep water (Fig. 1a). In lakes and ponds of the Southeast, terrestrial (on shore) plants of *S. isoetiformis* have short (0.5-1.0 dm) phyllodia, flattened dorsally, some, at least, of the phyllodial tips slightly dilated and laminar (Fig. 2b). In water the phyllodes are lax and very much longer (to at least 4-5 dm), flattened and strap-like, and with gradually attenuate tips (Fig. 2a). Rarely the phyllodia of submersed plants are slightly dilated at their apices (Fig. 2c). Both *S. teres* and *S. isoetiformis* have slender rhizomes (Figs. 1a, b and 2a, b). The surface of the achene of *S. teres* has an irregularly crenate dorsal keel and 2-4 (or more) prominent, rugose or irregularly knobby facial keels with no oil glands apparent in the facial view (Fig. 1c). The surface of the achene of *S. isoetiformis* has a somewhat irregularly crenate to entire dorsal keel and three or more low, non-rugose or non-knobby facial keels between which the oil glands are conspicuous (Fig. 2f).

Sagittaria graminea var. *graminea* forms stout, horizontal rhizomes from which shoots of the season emerge. If the rhizomes are submersed (in Florida, at least), prominent rosettes of broad flat phyllodia occur during winter. In spring, at about the time inflorescence scapes are produced, new leaves arise which have elongate petioles and emerged laminae (Fig. 1d). If the rhizomes are not submersed during winter, rosettes of flat phyllodia are not produced and the spring leaves are of the same type as the spring leaves of submersed plants. Both *S. teres* and *S. isoetiformis*, as indicated above, have very slender, elongate rhizomes. In regard to the winter rosette phyllodia of *S. graminea* var. *graminea*, it is important to emphasize that they exhibit much variability in size, particularly length. They range from a few centimeters long in shallow water to about 6 dm long in deeper water. Fluctuation of water depth in places inhabited by this plant frequently varies markedly in short periods of time. Thus plants which formed rosettes in shallow water may have short phyllodia at a given time even though the water may have recently become fairly deep owing to recent rains. On the other hand, plants which have been submersed in fairly deep water all winter have long phyllodia.

The achenes of *S. isoetiformis* and *S. graminea* var. *graminea* are much alike with respect to keels and oil glands. We have not attempted to examine and compare large numbers of them to ascertain whether or not they have subtle distinctive features of systematic value.

In conclusion, *Sagittaria isoetiformis* is considered specifically distinct from *S. graminea*, var. *graminea* and from *S. teres*. The former occurs in the coastal plain from southeastern North Carolina to peninsular Florida and westward to southern Alabama. The latter occurs from eastern Massachusetts to southern New Jersey (to eastern Maryland according to Fernald, op. cit.), *S. graminea* var. *graminea* is widespread in eastern and central North America.

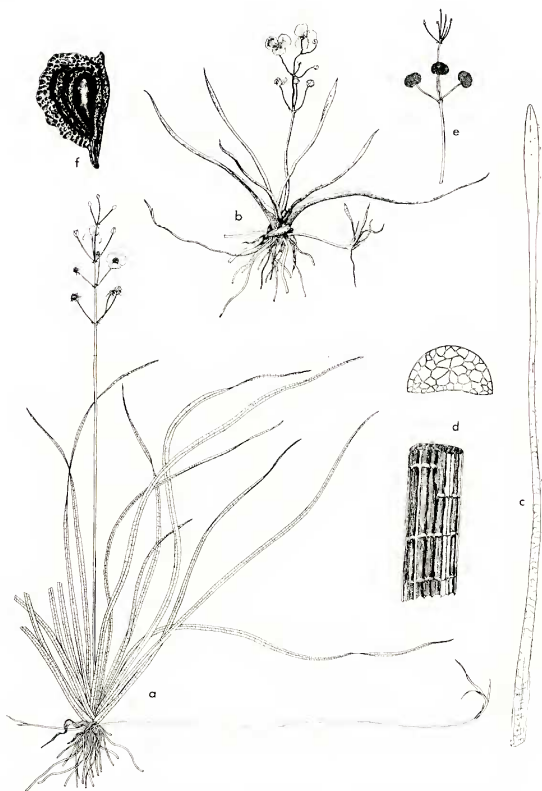


Fig. 2. *Sagittaria isoetiformis*. a. Habit, submersed plant. b. Habit, on shore plant. c. Unusual leaf of submersed plant. d. Cross and longitudinal sections of phyllode of emersed plant. e. Enlargement of fruiting inflorescence. f. Achene.

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